

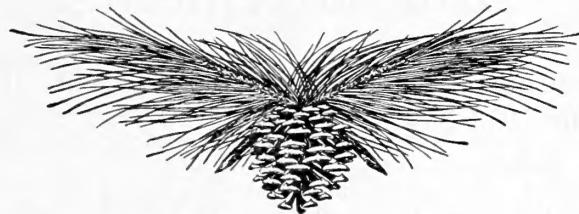
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FOREST WORKER



November, 1932

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UNITED STATES DEPARTMENT OF AGRICULTURE*

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Announcements

National Research Council Offers Fellowships for 1933-34

Fellowships in the biological sciences, including forestry, are again offered by the National Research Council to qualifying citizens of the United States and Canada for study and research in America or abroad. The purpose of these fellowships is the promotion of fundamental research through the development of an increasing number of thoroughly trained investigators. Appointment is restricted to those applicants in the early stages of a research career who possess a Ph. D. degree or its equivalent, have demonstrated a high order of ability, and give promise of developing individual judgments and viewpoints in investigative work. The choice of place to work is left with the fellow, subject to the approval of the fellowship board of the council. Appointments are for full time for one year but are subject to renewal. The basic stipends awarded per annum are \$1,620 for unmarried fellows and \$2,070 for married fellows in America, or \$1,620 and \$2,160, respectively, with additional travel allowance, for unmarried and married fellows appointed to study in Europe.

Applications for fellowships for 1933-34 must be in the hands of the fellowship board not later than March 1, 1933. Appointments will be made about the 1st of May. Requests for further information should be addressed to the Chairman, Board of National Research Fellowships in the Biological Sciences, National Research Council, Washington, D. C.

Sessions of Interest to Foresters at Meeting of A. A. A. S. in December

A session devoted to the physiology of forest trees is scheduled to be held by the American Society of Plant Physiologists in connection with the meetings of the American Association for the Advancement of Science at Atlantic City, N. J., December 27-31, 1932. All interested members of the Society of American Foresters and the Ecological Society of America are invited to participate in this joint session, which is to take place on the afternoon of December 30.

Also of interest to foresters at this meeting is the symposium to be conducted by the Ecological Society on the morning of December 30. The subject is "Some Aspects of Forest Succession," and such factors as humus, moisture, light, and fire will be considered.

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Because the free edition is necessarily limited, this periodical can be distributed without charge outside of the Government service only to such persons and organizations as State forestry and conservation officials, State agricultural extension directors, faculties and libraries of forest schools, and forestry associations. Others desiring to obtain copies of the *FOREST WORKER* can do so by sending 5 cents for a single copy or 25 cents for a year's subscription to the Superintendent of Documents, Government Printing Office, Washington, D. C. Foreign subscriptions: Yearly, 35 cents; single copies, 7 cents.

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State Forestry

Indiana Establishes Two New Forest Nurseries

Two new forest-tree nurseries have been established by the division of forestry of the Indiana Department of Conservation during the past summer. Both are so located as to spread employment to new localities in the State and to reduce shipping costs of trees distributed for forest plantings.

A nursery of 10 acres with a capacity of a million and a half forest transplants a year has been established at Shakamak State Park, near Jasonville, in southwestern Indiana. This nursery is operated jointly with the division of lands and waters of the department of conservation and will supply stock for both park and forest plantings. A comprehensive planting plan is being followed at Shakamak Park, where approximately 460 acres of old fields are being reforested over a period of four years by the division of lands and waters. Since the park is located in the territory where coal-mining operations are turning several hundred acres of soil upside down, it will be the policy of the forestry division to use the Shakamak nursery chiefly as a source of transplant stock for planting these stripped coal spoil banks. Coal operators in Indiana are planting a million trees a year on this type of land under a working plan that has been in operation for the past four years. In spite of extremely difficult planting conditions, it has been found that large transplant stock of white, red, Scotch, and Jack pines can be established successfully on these lands and that black locust makes phenomenal growth. The Shakamak nursery will also provide special stock for planting on all of the 10 State parks operated by the division of lands and waters.

At Brownstown, Ind., a transplant nursery with a capacity of a million trees a year has been developed in conjunction with the Jackson County State Forest, purchased during the past year. This nursery will be devoted to the production of transplants for general forest planting.

The major forest nursery in Indiana, located at the Clark County State Forest at Henryville, comprises approximately 28 acres under irrigation and intensive

cultivation. The nursery contains 15,000,000 seedlings and transplants and has a capacity of 3,000,000 transplants a year in addition to seedling stock for supplying the other nurseries.

According to State Forester R. F. Wilcox, the estimated annual distribution of forest planting stock in Indiana will probably be close to 5,000,000 transplants per year. Trees are sold for one-half cent to 1 cent each to make the nursery self-supporting.

State Forests Donated to Rhode Island and Connecticut

Two areas to be used as State forests have been donated by the Wickabonet Farms (Inc.), of Rhode Island—one, of 270 acres, to Rhode Island and the other, of about 250 acres, to Connecticut. A. Studley Hart, on behalf of the Wickabonet Farms, presented deeds to the tracts at a formal ceremony held in connection with a meeting of the Rhode Island Forestry Association and attended by Norman S. Case, Governor of Rhode Island; Harry R. Lewis, Rhode Island Commissioner of Agriculture; Raymond G. Bressler, president of Rhode Island State College; Austin F. Hawes, State forester of Connecticut; and other State and forestry officials.

In accepting the area in West Greenwich which will constitute Rhode Island's second State forest, Commissioner Lewis expressed the hope that other gifts of land will be made to the State so that every section may have an area for demonstration of forestry possibilities and practices. The deed of gift of the new forest, which has been named the Wickabonet State Forest, included the following conditions and recommendations: That management and supervision shall be under a trained forester, a graduate of a good forestry school with at least two years' technical experience; that the State commissioners of birds shall have the use of the forest for breeding wild fowl and animal life; that the forest shall be open to the use of the Rhode Island State College and Brown University in connection with courses in forestry, to the Boy Scouts for educational purposes, and to the United States Department of Agriculture for experiments looking to the

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restoration of chestnut trees in Rhode Island; and that the town of West Greenwich shall be compensated for the loss of taxable property by being permitted to obtain from the forest, for the cost of labor only, such wood as may be needed by its schools.

The tract accepted for Connecticut by State Forester Hawes is in the town of Voluntown and will be added to the Pachaug State Forest, bringing its total area to 9,253 acres. The new portion will be known as the Wickaboxet Block and will be under the direction of Ranger Gordon Abbott.

Abundant Seed Crop Gathered in the Adirondacks

Pine and spruce trees in the Adirondack Mountains produced extraordinarily abundant crops of cones this year. Many needy families in the region have earned money gathering the cones and selling them to the New York Conservation Department, which needed an unusually large number of forest-tree seed for its reforestation program. At its seed station at Willsboro, N. Y., the department is paying 50 cents a bushel for white pine cones and \$1.75 a bushel for red pine and spruce cones, which are more difficult to gather. The fund of \$20,000 which was set aside for the purchase of seed has already been almost entirely expended and the department has been supplied with enough seed to last for about three years. The seed house at the station is overcrowded and cones are heaped on tarpaulins on the ground. After they are dried and heated at the seed house the seed are shaken from the cones and stored in huge glass jars.



Unemployment camps to be maintained by California within and adjacent to the national forests of the State will probably be allotted \$300,000 this year out of State gas-tax money. A total of \$700,000 will probably be devoted to this work by the State in 1932-33 as compared with \$100,000 spent on the project last winter. The governor's committee on unemployment camps expects the work to be started earlier this fall and to run later into the spring. The camps are managed by the State board of forestry with the cooperation of national forest officers.



Pennsylvania forest-tree nurseries contained 37,000,000 trees on September 1, 1932. Nearly 10,000,000 trees, 10 per cent of which are transplants, are available for shipment this fall and next spring. The species are red, white, pitch, and Scotch pines, Norway spruce, larch, black locust, black walnut, yellow poplar, and white ash. More than 27,000,000 trees growing in the State's four nurseries will be available for reforestation purposes in Pennsylvania in 1934 and 1935.

Small Landowners in Georgia Organize for Fire Protection

A new type of fire-fighting unit has been inaugurated in Georgia through a plan developed by the forestry division of the State department of forestry and geological development. The organizations, to be known as the "Forest Fire Fighters," will provide for the fire-protection needs of landowners whose forest holdings are too small to come into the 10,000-acre minimum unit of the timber protective organizations. They will foster cooperation among small owners, provide leadership in fire fighting, and establish local responsibility for fire control.

The first unit of this type of organization has been formed in the vicinity of Commerce, in Jackson County, by C. L. Veatch, agricultural vocational teacher, who was active in the development of the plan. Reports received by State Forester B. M. Lufburrow indicate that a number of other communities are ready to organize on the same principle. District foresters in charge of the work of organization and supervision are assisted by special patrolmen and by vocational agricultural teachers.

The landowner joining a Forest Fire Fighters unit signs an individual contract, and the organization enters into a cooperative agreement with the State forest service. The landowner agrees to make a sincere effort to keep fires permanently out of his timberland; to employ methods of fire protection recommended by the State division of forestry; to aid other members of the organization, when called upon, to fight fires on their lands or fires that threaten members' lands; and to report fires on his land and the expense of controlling them. The State division of forestry agrees, on its part, to demonstrate methods of fire prevention and control, supervise fire fighting whenever possible, advise as to forest management, and to refund 50 per cent of the costs of fire-fighting equipment purchased by pooled funds of the organization, title to which will be in the State.

Maryland Fire Tower has Unusual Features

A new 120-foot steel fire tower recently erected in Dorchester County, Md., about 2 miles south of Church Creek, was constructed from a design which retains a uniform taper from the base to the floor of the cab, an unusual feature in a tower of this height.

There are no hills in southwestern Dorchester County, and the site chosen for the tower being at an elevation of only 4 feet it was necessary to sink the concrete abutments approximately 2 feet below sea level. This is believed to be the first forest-fire tower to have foundations extending below sea level.

Black Walnut Seed Distributed for Planting in Indiana

In the past two planting seasons 2,323,000 black walnut seed have been distributed to tree planters in Indiana. Starting originally in 1927 in cooperation with Frank S. Betz, internationally known tree planter, the distribution of tested, stratified walnuts by the division of forestry of the Indiana Department of Conservation to planters in the State has averaged more than a million walnuts a year for the last three years. The walnuts have been planted by farmers, business men, school children, nature-study clubs, sportsmen's organizations, and the American Legion. A large number have been used in reforestation work on the State forests, game preserves, and parks. In the spring of 1932 more than half a million black walnut seed were planted on the Morgan-Monroe Counties State Forest alone in an effort to reestablish this valuable species in the composition of the stand.

The large quantities of nuts purchased by the division of forestry for this distribution have been obtained through the help of county agricultural agents, who have encouraged collection of walnuts in their counties as an added source of revenue to local farms. The 4-H club boys and girls and labor otherwise unemployed were available to aid in the collecting.

The nuts are gathered in the fall, hulled, and tested in water to eliminate those which show by floating that they are not viable. They are hauled by truck to the State nursery in Clark County, where they are stratified in bins, some of which are as large as box cars. In the early spring the sand and nuts are shoveled over a screen and separated. The walnuts are packed in strong burlap sacks with wet moss to keep them from drying out during shipping. If the germination period of the walnuts is watched carefully, they can be distributed and planted before they start to crack open and without injury to the sprouting embryos.

It has been found that the seed of black walnut are much more satisfactory for planting than 1-year walnut seedlings grown in nursery beds, and they can be transported and planted more cheaply. The establishment of walnut trees the first year from the nuts has averaged from 50 to 60 per cent of the number planted. Delayed germination usually adds another 10 to 20 per cent the following year. In experimental plantings where nuts and trees were used side by side it was demonstrated after two years that the trees coming from the nuts were much more vigorous and more satisfactory in every way.

Planting black walnut seed is easy. The top of a bran sack half filled with nuts can be rolled down and a string tied to two corners and thrown over the planter's shoulder. Swinging a light grub hoe with one hand and using the other to take walnuts from the sack, a workman can plant the nuts almost as fast as a man would ordinarily walk.

Squirrels and other rodents always take their share of the planted nuts, and experiments are being conducted this year with light creosote and oil treatments to determine the proper solution to make the seed unpalatable to the rodents and yet not interfere with successful germination.

Nurseries and Planting in Puerto Rico

BY WILLIAM R. BARBOUR, Insular Forester, Puerto Rico

Methods of nursery and planting technic used in Puerto Rico differ greatly from those in temperate regions. Forest administration in the island is also somewhat unusual because of the fact that the insular forester is at the same time supervisor of the Luquillo National Forest. Under these circumstances a very close coordination naturally exists between the insular and Federal services. The Puerto Rican forest nurseries have so far furnished all stock for planting on the national forest, partly free of charge and partly at cost.

There are three insular nurseries in Puerto Rico, the main one at Rio Piedras, supervised by a technical planting specialist, and two subnurseries at the western end of the island, operated respectively by a forest inspector and a forest guard, both of them trained at the Rio Piedras nursery. These three nurseries have a combined annual production of about 2,000,000 young trees, most of which are 4 to 6 month seedlings, the rest being transplants. More than 200 species of trees, both native and exotic, have been tried out in these nurseries. Tree seed obtained from all regions of the world, tropical, subtropical, and even temperate, have been planted. Many have proved to be unsuitable, so that the principal production of the nurseries has gradually been curtailed to a dozen or so species, though many other kinds are still grown on a small scale. During the past fiscal year, for example, there were distributed 124 species of seedlings, of which the first 12 constituted nearly 95 per cent of the total number. These 12 included *Casuarina equisetifolia* (Australian), *Cedrela odorata* (native Spanish cedar), *Samanea saman* (South American), *Cassia siamea* (East Indian), *Swietenia mahogani* (West Indian mahogany), *Eucalyptus* (Australian), and 6 other species about equally divided between native and exotic.

The Rio Piedras nursery is equipped with 350 concrete-walled seed beds, each 4 by 25 feet. The soil in them is elevated a foot above the intervening paths chiefly to prevent the depredations of insects, notably the "changa" or mole cricket. The fertility of the soil is maintained by the use of compost, green-cover crops (especially *Canavalia* beans), and more recently a 9-9-9 commercial fertilizer which has given excellent results, speeding up the growth of the seedlings by at least 25 per cent. Generally speaking, species grown in the concrete beds are those of moderate delicacy, which must be given partial shade until germination. From 6 to 16 ounces of seed are sown broadcast per bed, covered with a thin layer of river

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sand, and shaded by lath-and-wire woven screens in rolls 4 feet wide and the length of the bed. Damping off is held in check by occasional fumigation of the soil with formalin and light applications of Bordeaux mixture. If, as sometimes happens, ants become too numerous, they are controlled by the use of powdered cyanogas. The yield of seedlings per bed is from 1,000 to 5,000, depending on species. Seedlings are lifted when 12 to 18 inches tall, suppressed individuals being transplanted and held for an additional two months or more before shipment.

Seed of the Leguminosae and of other families which are not delicate are sown broadcast in temporary beds, covered with sand, and given no special attention. The most delicate types, especially Eucalyptus, whose seed are almost as fine as grains of pepper, are sown in shallow flats and started in a greenhouse, being pricked out in transplant beds when a few inches high. Species imported in small quantities for experiment are also started in the greenhouse.

As most tropical tree seed soon lose their viability, no attempt is made to store them for long periods. Tin milk cans with tight-fitting lids give better results as storage receptacles than loose sacks. Germination tests, both in dishes and in soil, are run at frequent intervals. Usually the percentage holds up well for some months and then suddenly drops almost to zero. To insure that seed collectors and dealers outside of Puerto Rico furnish proper seed, a collection is maintained of almost 200 bottles of authentic samples of seed, with which shipments can be compared. This collection of seed of tropical species, already probably one of the most complete in the world, is constantly being increased.

Seedlings to be shipped are lifted from the beds by the use of spades, sorted and counted, and their roots packed in wet sphagnum moss and covered with burlap. From 100 to 1,000 constitute a package, which is shipped by either parcel post or express. Neither roots nor tops are pruned. The seedlings will remain in good condition in the bundles for several days. A careful record is kept of all shipments. The trees are listed by species, municipalities, recipients (governmental departments, individuals, etc.), and destined use (timber production, windbreaks, coffee shade, or ornamental). So far as possible, shipments are later followed up by the Puerto Rican extension forester.

Nearly all planting in Puerto Rico is by the hole method, using hand labor exclusively. The only exception is in the case of seedlings on special order which are transplanted in the nursery into tar-paper cylinders, and finally planted pot and all. This method will give high percentages of survival under even the most adverse climatic conditions. Seedlings in bundles are given away, but a charge of 4 cents apiece is made for potted trees. A charge of \$6 per thousand is made for seedlings shipped outside of Puerto Rico, as, for example, to the neighboring Republic of Santo Domingo.

Planting costs vary tremendously, depending on the accessibility and condition of the site. On a basis of a spacing of 8 by 8 feet (675 trees per acre) the average planting cost is about \$5 per acre, or about \$9 per acre including the cost of growing the seedlings, which averages close to \$6 per thousand. Two subsequent cleanings at 6-month intervals bring the total cost to about \$12 per acre.

The Puerto Rican Forest Service has planted about 1,000 acres on its insular forest reserves, partly by the use of seedlings and partly by direct seeding with certain large-seeded species. Some of these plantations are now 10 years old.

The United States Forest Service made its first experimental plantings on the Luquillo National Forest last year. About 40 acres have been planted, using nine species in various mixtures. Most of these plots promise to give excellent results.

Rates of growth in Puerto Rico are much higher than in temperate regions. A plantation of Casuarina on very poor soil, for example, spaced 8 by 8 feet, at 10 years of age averages 57 feet in height and 6.1 inches in diameter breast high, yielding more than 32 cords of firewood, or 4,200 fence posts, per acre. Mahogany and Spanish cedar trees 25 years old are more than 24 inches in diameter breast high, with a usable length of two 16-foot logs. There is probably no place in the world where artificial reforestation will yield greater financial returns than in Puerto Rico.

Though the production of the Puerto Rican forest nurseries has expanded steadily for more than 10 years, at no time has it caught up with the demand. If funds to produce 3,000,000 seedlings a year were available, that number could easily be disposed of. At a conservative estimate, there are in the island over half a million acres of denuded land not now used for agriculture. Much of it is on the higher mountain slopes. Reforestation of these lands would not only have a marked effect on climate and stream flow, but would in a comparatively short term of years yield substantial financial returns.



Allotments of Federal funds to States for cooperative growing and distribution of forest planting stock to farmers under the Clarke-McNary Act amount to \$71,968 for the fiscal year 1933. Funds for administration and for possible allotment to new States bring the total to \$79,960. For 1932 the fund amounted to \$95,000. An increase in the total amount of State funds will offset the decreased Federal allotments, however. The 1933 total of cooperative State and Federal funds combined is placed at \$285,197.44, as against \$275,206.15 for the fiscal year 1932. Thirty-eight States and the Territories of Hawaii and Puerto Rico cooperate with the Federal Government in this work.

Hybrid Larch Making Good Growth in Ohio

Several thousand seedlings of a new hybrid larch known as the Dunkeld larch (*Larix eurolepis*) are making unusually rapid growth in the Ohio State nursery and are being watched with great interest. The seed from which they have been raised were obtained by the Ohio Forestry Department two years ago from Scotland, where the tree grows several feet in height a year after becoming established. It promises to become one of the important larches in that country.

The hybrid resulted from cross-fertilization of the European larch (*Larix europea*) and the Japanese larch (*L. leptolepis*), at Dunkeld, Scotland. The supply of viable seed produced by the mature trees is limited and general distribution outside of Scotland has been avoided.

The Year's Accomplishments in Hawaiian Forestry

Changes made in the forest reserve system of Hawaii during the fiscal year ended June 30, 1932, resulted in the net addition of 5,950 acres, according to the report of Territorial Forester C. S. Judd. The total area of land in the 64 forest reserves on the five main islands is now 1,027,264 acres, of which 65 per cent is owned by the Territory.

The work of protecting this vast forest estate, which is devoted mainly to the conservation of water, was advanced during the year by the construction of 14.10 miles and repair of 14.10 miles of fences on forest reserve boundaries, the planting of 323,111 trees on open places on Government lands in the reserves, and the removal of 7,947 destructive wild goats, 5,060 wild pigs, 2,193 sheep, 66 cattle, 13 asses, and 6 wild horses.

The four tree nurseries of the division of forestry distributed a total of 871,486 plants during the year. Of these, 398,713 consisted of trees given out to farmers under section 4 of the Clarke-McNary Law.

The George Washington Memorial Grove of 2,000 coconut trees at the Mokapu game farm, on Oahu, was dedicated with appropriate ceremonies on February 20, 1932. Preparations for the establishment of a grove of over 1,000 sandalwood trees to be planted out this fall on a ridge near Honolulu have been made by the setting out of 3,000 trees to serve as hosts, sandalwood being a root parasite.

A reclamation project on the eroded ridge back of Fort Shafter, carried on in cooperation with the United States Army, was completed in March by the planting of about 20,000 trees on the shifting soil.



Experiments have proved the practicability of growing carpet grass on plowed firebreaks in Florida, says State Forester Harry Lee Baker. A good stand now exists on a line 40 feet wide and 2 miles long on the property of the Loncala Phosphate Co. near Clark, just south of High Springs, Fla. The Florida Forest Service is conducting experimental work on the same area with centipede grass to determine its suitability for planting on high, dry sites where the carpet grass, which prefers low, damp locations, will not thrive.



A State fish and game department has been organized by Mississippi and a fish and game commission appointed which includes Edward McIntyre, chairman, W. G. McGill, and Ben M. Stephens. Hunter Kimball was named director of the new department. Mississippi is the forty-eighth State to organize such a department and commission.

Education and Extension

New York State College Acquires a Wild Life Station

A gift of a forest in the Adirondack Mountains, embracing 14 parcels of land and lakes aggregating more than 13,000 acres, has been accepted by the trustees of Syracuse University for the New York State College of Forestry. Donated by Archer M. Huntington and his wife, Anna Hyatt Huntington, of New York City, the forest will be known as the Archer and Anna Huntington Wild Life Forest Station.

The area is located principally in Essex County, in townships 27 and 28 and the town of Newcomb, and is accessible from the Newcomb-Long Lake highway near Rich Lake. It contains two large and numerous small lakes, streams, marshland, wooded slopes, and two mountains of more than 2,500 feet in height, and is exceedingly rich in the flora and fauna of the eastern Adirondacks.

The land will be used for experiment and research in relation to the habits, life histories, methods of propagation and management of fish, birds, and game and

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fur-bearing animals by the Roosevelt Wild Life Station at the College of Forestry and also by the college directly in the promotion of forestry as an aid to game management. "Under the direction of the college and through the Roosevelt Wild Life Station it should be possible to take this miniature of the Adirondacks as a whole and make it gradually a reservoir of information as to the most scientific and most practical means of making our forest areas give the maximum of usefulness," said Dean Hugh P. Baker, of the college. "In carrying out the purposes of the donors it should be possible to demonstrate that both the wild life and the forest in all of its phases can be kept in balance, producing increasing values in the way of wild life, recreation, and direct forest products."

Both Mr. and Mrs. Huntington have long been interested in wild life. Mrs. Huntington, who is internationally known as a sculptor, did her earliest and some of her most noted work in this field.

Four-H Clubs of Louisiana Parish Receive Gift of Forest Lands

To provide a place for practical forestry instruction, demonstration of the possibilities of forestry, and as the basis of an endowment fund for the education of 4-H club members, H. C. Thompson, of Oaklawn, St. Tammany Parish, La., has donated two tracts of forest land to the 4-H clubs of his parish. Mr. Thompson, who has done reforestation work on his lands with seedlings obtained from the Louisiana State nursery, became interested in the forestry work of the 4-H clubs as a result of the forestry program of Extension Forester Robert Moore and County Agricultural Agent O. G. Price.

St. Tammany Parish is in the extreme southeastern portion of Louisiana, bordering on Lake Pontchartrain. Most of the magnificent stands of longleaf pine which once grew there have been cut for many years, and the last of the virgin timber is now being removed. Though practically at the western limit of the slash pine belt, it contains good second-growth stands of slash pine.

One of the donated tracts comprises 170 acres of sandy, poorly drained soil. It has been fenced with a hog-tight fence 5 feet in height. There are about 100,000 longleaf-pine seedlings on the area as the result of experiments by Mr. Thompson in both direct seeding and planting, as well as a good stand of young slash pine. The type of soil would indicate that the slash pine will constitute the final stand. A gravel road is now being built past the tract.

The other area contains 255 acres of better-drained soil. A road passes through it, and there is a frontage of a quarter of a mile on Bayou Lacombe. The railroad is about a mile and a half distant. The timber is a mixture of slash and loblolly pines about 30 feet in height, with the former predominating; seed trees of

both species are still standing. Mr. Thompson is having the stand thinned, the slash pine being favored. This area has unusually good recreational possibilities.

Plans for handling the tracts are still in the formative stage. The area will be used for experimental purposes as well as for demonstration and education, and the possibilities of financial returns from timberland will be emphasized as strongly as is consistent with good forestry practices. Aid in the development of management plans has been requested from the Southern Forest Experiment Station, the Louisiana Division of Forestry, and the department of forestry of the Louisiana State University.

Black Locusts Successful in Idaho

Black locust trees planted in Idaho for windbreaks, shelter belts, and farm timber have responded remarkably to irrigation, according to reports of the State's extension forester. On a farm near Moscow black locusts planted 22 years ago have reached 14 inches in diameter. The owner estimated the gross yield from a quarter acre on which the timber was recently cut at \$10 a year from the time of planting. On an adjoining strip cut four years ago some of the sprouts from stumps and roots were found to be 20 feet high and 4 inches in diameter.

The locust borer, which has been a menace to eastern plantings, has not appeared in Idaho.

Institute of Paper Chemistry Receives Memorial Building

A library and laboratory building presented to the Institute of Paper Chemistry, graduate technical school affiliated with Lawrence College, Appleton, Wis., was recently dedicated to the memory of J. A. Kimberly, pioneer paper manufacturer of Wisconsin and father of the donor, James C. Kimberly. The new \$100,000 building will house the colloid chemistry, wood technology, and optical laboratories, and the library.

Thirty-five students, graduates of 22 colleges and universities, selected from more than 200 applicants, are enrolled in the institute this year.



A course in professional forestry designed especially to train young men for forest work in the southern California region will be offered for the first time this fall at the University of California at Los Angeles.



Each 4-H club member in Virginia selecting a reforestation project can obtain up to 1,000 tree seedlings free from the Virginia forest service,

Forestry Training in British Universities Studied

A committee of British foresters and educators appointed by the Secretary of State for the Colonies "to consider and report on the training of candidates and probationers for appointment as forest officers in the government service," has made an interesting report on the results of its investigations.¹ The curricula in the forest schools of the five British universities offering a degree or diploma in forestry—Oxford, Cambridge,² Aberdeen, Edinburgh, and Wales (Bangor)—were carefully studied in connection with the actual practical qualifications proved necessary by experience for forest officers in different parts of the Empire. The conclusions and recommendations of the committee are summarized in the report as follows:

(1) When the requirements of the services are taken into consideration the courses of instruction in forestry now given in the universities are not satisfactory, particularly in respect to field work;

(2) A forest officer can not be adequately trained in a course restricted to three years;

(3) The cost of extending the forestry courses to four years in all the universities concerned and of bringing each course up to the required standard would be prohibitive;

(4) The services offer the main opportunities for the employment of graduates in forestry, but each year only 20 to 25 probationers are required. This demand is unlikely to be exceeded in the near future;

(5) For the requirements of the services it is unnecessary to have as many as five schools of forestry, and the provision of additional State aid in support of these schools can not be justified under existing conditions;

(6) The standard attained by the candidates who present themselves for appointment to the services affords evidence that recruitment is on too narrow a basis;

(7) We recommend that in future the course of training should extend over four years, of which the first three only should be taken at one of the university schools of forestry, the final year being spent at the Imperial Forestry Institute;

(8) The university degree courses should be remodeled so as to concentrate the training on the fundamental aspects of forestry, as exemplified by European practice, omitting the more highly specialized branches of the subject;

(9) The Imperial Forestry Institute should be made responsible for instruction in the specialized subjects named in our report, and should become a permanent and essential feature of the preservice training of forest officers;

(10) Provision should be made to facilitate the recruitment of candidates who have read for honours in arts or science. This can best be secured by the institution of a scholarship scheme, the conditions of which should be kept as elastic as possible;

(11) We recommend that any university which desires to present candidates for the forest services should be required to maintain its instruction at a satisfactory level of efficiency, and we suggest the means by which this can be secured.

Present forestry work at the Imperial Forestry Institute at Oxford was commended, but recommendations were made that the following seven courses should be offered during the fourth or final year, of which students should be required to select not less than six: Forest policy, economics and law; tropical forestry and botany; British silviculture (special problems); forest engineering; advanced forest mycology and forest entomology; wood technology; and forest soils.

University of California Adds New Wood Specimens to Its Lumber Exhibit

One of the most complete exhibits of lumber in the United States is now on display in Giannini Hall, at the University of California, Berkeley. The recent acquisition of 19 new specimens (14 of woods of the United States and 5 from foreign countries), brings the total number on display to 180, according to Emanuel Fritz, associate professor of forestry at the university.

The new foreign specimens, which increase the number of foreign woods represented to 115, are of teak from Siam, macuba and rosewood from Brazil, and cocobolo and lignum-vitæ from Central America. Macuba wood is being sold in the San Francisco region for use in fancy cabinet work. Specimens of American woods recently acquired include beech, birch, maple, tupelo, basswood, magnolia, Tennessee red cedar, quartered red oak, plain red oak, quartered white oak, plain white oak, hickory, and ash.

Supplemented by three or four thousand specimens kept in the laboratories of the forestry department, the exhibit woods are used for actual study by forestry students.

Louis Marshall Memorial Dedication Postponed

Dedication of the Louis Marshall Memorial, the new science building at the New York State College of Forestry, Syracuse University, announced for November 18, has been postponed until February or March of next year. The ceremonies will take place after the building is occupied by the science departments of the college, which are expected to start regularly functioning there at the beginning of the second semester.



Students of vocational agricultural schools in Georgia are encouraged by the State division of forestry to collect tree seed which the division buys for planting in the State forest nurseries.

¹ Great Britain, Colonial Office: The Training of Candidates and Probationers for Appointment as Forest Officers in the Government Service. Colonial No. 61, 55 pp. London, 1931.

² Since publication of the report the general board of Cambridge University has definitely decided to discontinue its department of forestry after October, 1935, when the last examination for the diploma in forestry will be given. This action had already been under consideration.

Connecticut 4-H Forestry Club Wins First Prize at State Fair

"The Easton Forest Rangers," a 4-H forestry club of the town of Easton, Conn., won first place with their forestry exhibit at the annual State club fair, held at Durham, in competition with exhibits of all agricultural and home-making clubs of the State. The exhibit not only excelled in general make-up and appearance, but exemplified the organization's ideal of community service.

The club members are well equipped and trained for forest fire-control activities in their community. The State forest service has provided them with fire pumps and tools and has enlisted them as one of its registered crews. Another example of their community service is the management of the Easton town forest, an undeveloped area of young hardwoods. About a year ago the town suggested that the club take charge of this forest and develop it. The club accepted and

divided the area into plots with a boy assigned to each plot. Weeding and thinning was undertaken under the supervision of a competent local leader. Already several acres have been improved.



Forty vocational agricultural schools in 25 Ohio counties planted 220,000 forest trees during the past year, an increase of nearly 100,000 over last year's record, reports F. W. Dean, extension forester of Ohio. The trees planted were principally red, Scotch, Corsican, and Austrian pines. They were distributed at the rate of 1,000 each to vocational agricultural students making application on special blanks provided by the State department of forestry, the only charge being for transportation. The trees were 2 and 3 year seedlings, ranging from 5 to 10 inches in height. Most of them came from the State forest nursery at Marietta.

Forest Service Notes

Forest Canopy Left After Logging Reduces Fire Danger

By H. T. GISBORNE, United States Forest Service

Every timberland owner knows that if he cuts most or all of the trees on a forest area he lets in the sunlight and the hot, drying winds which the dense forest canopy excluded. Few, however, appreciate the effect of such openings in causing drier fuels and higher inflammability and in creating a danger which threatens not only the forest growth remaining but also surrounding timber, adjacent buildings, and other property. The owner may have noticed on previous cutting areas that the removal of the canopy endangers young growth by exposing tender seedlings to the excessively high temperatures of full sunlight and saplings and poles to sun scald and cat face, and dries out the ground so that new seedlings are not able to obtain sufficient moisture to survive the period of maximum drought. He has probably not measured these conditions; he only knows that there is great danger of fire on such areas.

Measurements recently made at the Priest River branch of the Northern Rocky Mountain Forest Experiment Station show the extent of that danger and also indicate that it is possible to cut timber without incurring these after effects. This can be done by using the so-called selection method of cutting which removes the merchantable and undesirable trees in the stand yet retains enough crown canopy to shade the ground and the mat of leaves and twigs covering it. This shade is the best insurance that the soil moisture

will be sufficient for seedlings and that the dead leaves and twigs on the ground will not become extremely dry and inflammable.

The following measurements were made at three stations, one fully timbered, one with half the forest canopy removed, and one clear-cut, only a few hundred yards apart in a northern Idaho valley bottom.

Factor measured	Fully timbered area	Half-cut area	Clear-cut area
Average maximum air temperature (degrees Fahrenheit).....	83.9	86.9	90.6
Average relative humidity at 5 p. m. (per cent).....	23.4	19.0	16.8
Average wind movement (miles per day).....	2.0	24.8	49.6
Evaporation rate (grams per period).....	34.7	93.4	206.7
Average maximum temperature just below surface of duff (degrees Fahrenheit).....	78.8	93.6	133.3
Highest duff temperature (degrees Fahrenheit).....	85.0	102.0	148.0
Average moisture content of duff (per cent).....	10.5	9.9	4.6
Average moisture of 2-inch-diameter dead wood (per cent).....	8.3	7.2	3.8

One of the most striking features in this tabulation is the extremely high temperature of 148° F., measured just under the surface of the dead leaves and twigs forming the carpet of duff covering the mineral soil. At the surface of the duff, in the full blast of the sun, the temperature was probably even higher than 148°. As surface temperatures above 120° to 125° F. are recognized as dangerous to young seedlings and temperatures of over 140° are generally fatal, the danger in such exposure to the sun is very clear. Under the partial shade of the trees reserved from cutting, however, the temperature rose to only 102°, while under the

almost complete shade of the undisturbed forest the maximum temperature in the duff rose to only 85°, or 1.1° above the highest air temperature recorded.

These conditions illustrate the effect of the tree crowns in absorbing direct sunlight and thereby preventing high temperatures in the ground and in the fuels on the ground. Air temperature, humidity, evaporation rate, and wind movement, other factors which make for drier fuels and faster spread of fire, were all improved by the presence of the crown canopy.

It is also evident from the measurements that removing half the timber canopy in order to log the merchantable trees and remove those diseased or otherwise defective did not result in drying out the site to the condition halfway between full timbered and clear cut. The measurements on the half-cut area resemble those for the fully timbered more than those for the clear cut. In other words, although half the crown canopy was taken out, the danger was not increased proportionately.

One important fact should be brought out here: Burning of débris must be done with extreme care in order to save all of the green canopy left after logging. If the burning is done at the wrong time of year or débris is burned broadcast rather than in piles, all the beneficial shade will be lost, and the area, fully exposed, will, after all, become a fire menace.

Aluminum Sulphate Saves Douglas Fir Seedlings at the Monument Nursery

Experiments with various chemicals to find a remedy for a disease threatening the growing of Douglas fir in the Monument Nursery, on the Pike National Forest, Colo., brought forth the discovery of the beneficial effects of aluminum sulphate. Douglas fir had been grown successfully in the nursery from 1907 to 1918, seeming well adapted to the site. In 1918 spots of weak and yellow seedlings appeared in the beds of 1-0 stock. The number of diseased seedlings which seemed to be affected by a root rot increased until in a few years it began to look as if the production of Douglas fir at the nursery would have to be discontinued.

Through the advice of Carl Hartley, forest pathologist of the Bureau of Plant Industry, a series of experiments was tried, which included the use of sulphuric acid, zinc sulphate, aluminum sulphate, ammonium sulphate, tannic acid, hydrated lime, Semesan, Uspulun, and sulphur. Different degrees of shade, moisture, and manuring were also applied to experimental plots. The results were negative for everything except the aluminum sulphate. Plots treated with this chemical showed remarkable improvement, and subsequent use of it on three-fourths of the Douglas-fir seed-bed area at the nursery was completely successful in eliminating the disease.

Solutions of aluminum sulphate of varied strengths are now used on all species at the Monument Nursery

The chemical lessens damping off, is an excellent weed eradicator, stimulates growth, and is a preventive of root rot. It is cheap, easy to apply, and does not damage clothing.

Pacific Northwest has Heavy 1932 Seed Crop

Reports from the 22 national forests of Oregon and Washington indicate that the forest trees of the Pacific Northwest are bearing an abundant supply of seed this year. Douglas fir is laden with cones over the entire west slope of the Cascade Range. This is the sixth abundant seed crop of that species since 1909 and practically assures the natural restocking of logged-off lands adjacent to standing Douglas fir timber. Other species reported to have a good seed crop include western hemlock, western red cedar, Port Orford cedar, white fir, Engelmann spruce, Sitka spruce, western white pine, sugar pine, and western larch. The ponderosa pine seed crop is heavy in some localities but is irregular.

Seed collectors this year include many unemployed who are gathering seed for sale to dealers.

Denver Unemployed Cut Wood on the Pike Forest

An interesting municipal plan for utilizing the services of the unemployed to obtain fuel for the needy is being carried out by the city of Denver, Colo. Under a free-administrative-use permit the city last spring established on the Pike National Forest two camps where wood is cut by men dependent upon the public for support. Each man is detailed to the camp for a period of three weeks. He receives no compensation in cash but is furnished clothes and tobacco, and his family in the city is supported.

The camps are managed by the city, but forest officers mark or designate the trees for cutting and the Forest Service furnishes a good deal of the equipment used in the operation. Cutting costs about 75 cents per standard cord. A portion of the wood has been hauled in trucks to Denver, a distance of 60 miles, at \$3.50 per cord. The Colorado & Southern Railway Co. has given the city free freight to a value of \$1,000 and wood is now being hauled to Estabrook, Colo., for shipment to Denver via the railroad.

The first camp to be established is about 9 miles from Buffalo, Colo., on lower Redskin Creek, in the ponderosa pine-Douglas fir type, at an elevation of 7,900 feet. The region surrounding the camp was recently cut over, but sapling and pole stands were left in which no cutting was done. These stands are thinned, sticks as small as 1 inch in diameter being utilized. In addition the tops and cull logs left from the old cutting as well as the pitch stumps that have lain on the

ground for many years are used. All green trees to be cut are marked by a forest officer, and a well-spaced, improved stand, averaging from 250 to 300 trees per acre, remains after cutting.

The other camp is located about 7 miles from Estabrook, toward the head of Redskin Creek, at an elevation of 8,400 feet. It is near the lower limits of the lodgepole-pine type. The stand in the vicinity of the camp consists almost entirely of saplings and small poles, the number per acre varying from 5,000 to 10,000. It is typical of stands on extensive areas in the Rocky Mountain region that were burned over about 50 or 60 years ago. Studies of sample plots established a few years ago by Supervisor E. S. Keithley, of the Pike Forest, indicated that such stands should be thinned to leave about 400 to 450 trees per acre; this number is being retained in the present thinning. The average diameter of the trees left is about 3½ inches at breast height. A forest officer marks with red paint the trees to remain and all others are cut. All material 1 inch or larger in diameter is utilized for fuel, an average of 7 cords being obtained per acre.

The forest as well as the city benefits from these cuttings, as they are of great value from the standpoint of silviculture and fire protection. Growth will be greatly stimulated, and the thinned stands, especially in the lodgepole-pine type, will be much more easily protected from fire than the unimproved, dense forest. A total of about 500 acres of forest lands has been put into very satisfactory silvicultural condition and probably an additional acreage of an equal amount will have been improved before the work is discontinued in the early winter.

Douglas Fir Region Gets Experimental Forest

A 10,000-acre tract of typical Douglas-fir timberland within the Columbia National Forest, Wash., has recently been set aside for research and demonstration purposes. The area lies near the geographic center of a broad belt of Douglas-fir land that extends north into Canada and south into California on the west slope of the Cascade range. It will be known as the Wind River Experimental Forest and will serve as a field laboratory and proving ground for the Pacific Northwest Forest Experiment Station.

The area is located on the Wind River watershed 10 miles north of Carson, Wash., and contains 4,500 acres of typical old-growth virgin timber, 3,500 acres of second growth now 90 years old, and 2,000 acres of burned-over land in varying degrees of restocking, part of which has been reforested by planting. Of the old-growth area, 1,200 acres will be set aside as a natural area to be kept in its virgin state for educational and scientific purposes. Studies, many of which are already under way, will cover economic selective logging and other methods of lumbering, slash disposal, fire

prevention and control technic, natural and artificial reforestation, growth and yield studies, thinnings, control of insects and disease, and the interrelation of plant and animal life in the forest.

Much Heart Rot Enters White Oaks Through Fire Wounds

By MARGARET S. ABELL, United States Forest Service

Heart rot was the cause of cull amounting to 40 per cent of the total gross board-foot volume of 56 white oaks examined immediately after a logging operation in 1930 on the Natural Bridge National Forest, Va., by R. M. Nelson and I. H. Sims, of the Appalachian Forest Experiment Station. The cull was nearly all in long butts and first logs, although one entire tree was left. How the heart rot had entered many of the trees was indicated by readily distinguishable fire scars; others were either hollow or so badly rotted that the point of entrance of the fungi could not be definitely determined.

The 56 trees studied were classified as follows: Sound trees with fire scars, 7; sound trees with no fire scars, 10; trees with rot traced definitely to fire scars, 18; badly rotted and hollow trees, 21. Logs were scaled and deductions made according to national forest practice. In the 18 fire-scarred trees containing rot 48 per cent of the total gross scale was left in the woods. It is very probable that the decay in many of the badly rotted and hollow trees, of which 58 per cent by volume was left, had also entered through fire wounds.

These trees were in a mixed oak stand which had been heavily cut about 1810. It had been burned over repeatedly before the establishment of the national forest in 1927. Scars gave evidence of 30 different fires ranging from 236 to 40 years before the examination. Some of the trees were overmature and the rot advanced.

Similar conditions have been found in other southern Appalachian hardwoods. G. G. Hedgcock states in the 1926 Yearbook of Agriculture, under the title "Fire-Scar Damage in Woodlands Heavy," that as high as 19 per cent of the volume in our eastern hardwoods is often lost through decay, of which more than 90 per cent of the basal or butt-rot type enters through fire scars. The report of the Forest Products Laboratory entitled "Small Sawmill Utilization of Appalachian Hardwoods," the result of a study in the Pisgah National Forest, N. C., attributes 17 per cent of all defects in red oak to fire; in chestnut, 20 per cent; and in basswood, 18 per cent. This includes actual fire damage and decay associated with fire scars under the heading "fire" in the classification of cull. Much larger percentages of the defects were charged to "rot or punk." In part of these fire may have been a factor.

That in the southern Appalachian hardwoods heart rot entering through fire wounds results in considerable cull is evident. There is little knowledge, however, of the variation of this form of damage in different stands and sections of the region.

Pacific Coast Forest Preserved as Natural Area

A tract of some 1,400 acres of the spruce-hemlock type within the Olympic National Forest, Wash., has been set aside to be kept in its natural state for educational and research purposes. It lies on the Olympic highway at the south approach to Lake Quinault and will be known as the Quinault Natural Area. The tract contains some of the finest specimens of Sitka spruce to be found in the few remaining stands of old growth in this timber type. Some of the best Sitka spruce timber obtained by the Government for airplane construction during the World War was cut from adjoining lands.

Funds Apportioned for National Forest Highways

Building of new highways in the national forests will be rushed with funds appropriated by Congress primarily to aid in relief of unemployment. The new roads will also open up the forests to greater use and assist in protection from forest fires.

The national forest highway fund of \$5,000,000 is allocated for expenditure in the various States, half according to the national forest area within the State

and half to the ratio that the value of national forest land in the State bears to the total value of national forest lands in all the States. Thirty-three States and Puerto Rico will share in the distribution of the fund for the fiscal year 1933 in the following amounts: Alabama, \$4,811; Arizona, \$347,798; Arkansas, \$54,315; California, \$829,566; Colorado, \$397,542; Florida, \$20,408; Georgia, \$11,739; Idaho, \$614,336; Illinois, \$478; Louisiana, \$2,390; Maine, \$1,672; Michigan, \$12,842; Minnesota, \$37,932; Mississippi, \$1,967; Montana, \$480,381; Nebraska, \$5,771; Nevada, \$111,170; New Hampshire, \$26,571; New Mexico, \$244,450; North Carolina, \$17,435; Oklahoma, \$3,844; Oregon, \$773,121; Pennsylvania, \$11,323; Puerto Rico, \$649; South Carolina, \$1,976; South Dakota, \$46,368; Tennessee, \$15,028; Utah, \$198,583; Vermont, \$1,910; Virginia, \$19,055; Washington, \$426,481; West Virginia, \$9,360; Wisconsin, \$5,131; Wyoming, \$263,602.



Malacosoma disstria, the forest tent caterpillar, which did much damage in the Natural Bridge National Forest, Va., in 1931, made a still more destructive attack on trees in that region in May and June, 1932. Nearly every species suffered, but oak was particularly affected. Many trees were killed and more will undoubtedly die from the effects of defoliation, especially on the drier sites.

General Forest News

A Remnant of Mississippi's Virgin Hardwoods

By GUS LENTZ, United States Forest Service

Three hundred and ninety years ago, exactly 50 years after Columbus landed at San Salvador, Hernando De Soto claimed the honor of being the first white man to view the mighty Mississippi. After journeying across what is now north Georgia and Alabama, De Soto and the other "white gods" who came with him entered the alluvial valley and proceeded into the country of the Chickasaws. Historians mention the vast stretches of unbroken timber through which the explorers painfully hewed their way. Progress was slow because of the density of the timber, the presence of many meandering bayous, and the constant fear of ambush. Traveling slowly, the white men had ample opportunity to observe and marvel at the wonderful gum, ash, oak, cypress, and other hardwood trees found on the rich alluvial soils of the Mississippi Delta.

Extensive exploitation of this hardwood timber began more than 40 years ago. Memphis, Tenn., rapidly

came to be the center of the southern hardwood lumber industry. Mills were located at numerous points in the Delta. When one tract was cut over the mill was moved to another tract of virgin timber or else new tram lines were built to bring logs from another tract to the old mill. The peak of production was reached for oak about 1909 and for red gum some 17 years later. Since 1926 production in Mississippi has shown a rapid decline. At present only a few of the extensive virgin hardwood stands remain on areas that have proved difficult to log. One such stand was recently encountered in Coahoma County, Miss., by a Forest Survey crew headed by Mark Lehrbas, on an area of unprotected or "batture" land in a bend of the Mississippi River known as Jackson's Point. Some timber has been cut on this point during recent years and the logs floated downstream to Greenville. On a considerable portion of the area, however, the timber is still untouched.

The timber growing on Jackson's Point consists mainly of cottonwood, willow, and box elder on the sandy soils; red oak, overcup oak, and red gum on the well-drained clay soils; and pure stands of cypress on

the poorly drained clay soils. On one quarter-acre sample plot in the cypress type the following tally was obtained: Number of cypress trees 14 inches in diameter breast high, 6; 16 inches in diameter, 4; 18 inches in diameter, 3; 20 inches in diameter, 8; 22 inches in diameter, 4; 24 inches in diameter, 7. Volume tables gave an estimated stand of 8,440 board feet, Scribner scale, per quarter acre, or about 33,700 board feet per acre.

On another quarter-acre plot where red gum and ash predominated, the tally was: 1 ash tree 14 inches in diameter breast high; 1 ash 30 inches in diameter; 1 ash and 2 red gums each 32 inches in diameter; 1 red gum 40 inches in diameter; and 2 red gums 44 inches in diameter.

On the latter plot the stand was estimated to contain 4,600 board feet of ash and 36,000 board feet of red gum, or a total of 40,600 board feet, per acre. Several of the red gum trees were more than 155 feet high; one tree 32 inches in diameter had a total height of 166 feet. In spite of their great height none of the red gum trees contained more than three merchantable logs, or more than 50 feet of usable stem. This illustrates the absolute necessity of basing volume estimates on the usable length of the bole rather than on total height. Furthermore, in dense stands it is difficult to measure total heights accurately.

The vast stretches of virgin southern hardwood timber, the former roosting place of the passenger pigeon, have almost followed the pigeon into extinction. Were De Soto now to retrace his steps across the upper portion of the Delta he would have to traverse an almost unbroken series of cotton and corn fields. Unless measures are taken to preserve a few of the remaining stands of virgin hardwood, the coming generation of Delta inhabitants will scarcely believe that such stands of timber were ever found on the fields where they follow the cotton-patch mule or wield the hoe between the cotton rows.

Blister Rust Quarantine Regulations Revised

A revision of the white pine blister rust quarantine regulations which have been in effect since October 1, 1926, was approved September 10 to become effective January 1, 1933. Five States—Iowa, Maryland, Ohio, Virginia, and West Virginia—are added by this revision to the list of those designated as infected with the rust, which already included Connecticut, Idaho, Maine, Massachusetts, Michigan, Minnesota, Montana, New Hampshire, New Jersey, New York, Oregon, Pennsylvania, Rhode Island, Vermont, Washington, and Wisconsin. Since the District of Columbia is surrounded by infected States, it is also classed as infected, although the blister rust has not yet actually been found there.

The new regulations will widely increase the market for 5-leafed pines raised under conditions in which

they are protected from rust infection. The embargo which prohibited the shipment of such pines from infected to noninfected States is removed, and the Federal pine-shipping permits which heretofore authorized shipments only between infected States may now be used for shipments to noninfected States also. The change is based on the satisfactory results of the protective work carried out around nurseries during the past several years.

At the same time the interstate movement into other infected States of 5-leafed pines grown in the lightly infected States is somewhat more restricted than heretofore, experience indicating that such pines should be raised in a *Ribes*-free environment to be safe from blister rust.

The embargo which has hitherto prohibited the movement of 5-leafed pines from points east of the Missouri Valley to the Western States is removed.

The interstate shipment of currant and gooseberry plants is also simplified by the elimination of the provision that such plants, if transported from infected States, were required to be both dormant and dipped in lime-sulphur solution. Hereafter such plants will not be required to be disinfected in lime-sulphur unless shipped with leaves or active buds.

Nut Growers Visit Experimental Chestnut Forest

By W. R. MATTOON, United States Forest Service

During their twenty-third annual convention, held this fall in Washington, D. C., the Northern Nut Growers Association (Inc.), made a field trip in near-by Maryland in the course of which the members visited several private nut orchards and inspected Government experimental work in chestnut propagation at Bell Station, Prince Georges County, Md. Here the Bureau of Plant Industry and the Forest Service are carrying on experiments in the breeding of blight-resistant chestnuts. Various species of Asiatic chestnuts have been introduced and crossed with the American chinquapin and the more resistant strains of native chestnuts. A plantation of Chinese mountain chestnut (*Castanea mollissima*) 21 years old is being watched closely. Shipments of nuts from these trees have been made to some of the States where they have been planted on State and selected private lands under the direction of the State foresters. Neither this species nor the hybrids have so far shown a development equal to that of the American chestnut. A tendency to crooked trunks and a slow rate of growth have yet to be overcome. G. F. Gravatt, of the Bureau of Plant Industry, is in charge of the experiments.

At the Washington meetings of the association many phases of nut growing were discussed, particular interest being shown in black walnut and northern varieties of pecans.

New Forestry Films Available

Four motion-picture films on forestry subjects recently prepared by the Forest Service may now be borrowed from the Office of Motion Pictures of the United States Department of Agriculture, only the cost of transportation to be paid by the borrower. Titles and descriptions of the films are as follows:

Building Truck Trails in the National Forests. Silent, one reel. Depicts use of modern machinery in construction of roads for quick transportation of men and equipment to forest fires; also shows spread of unchecked fire.

Forest Fires—or Conservation? Talking, three-fourths reel. Shows Secretary of Agriculture presenting to Scott Leavitt, United States Representative from Montana, a commission as a volunteer fire warden in his State. Mr. Leavitt makes a short talk on the importance of forest conservation, illustrated by forest scenes.

Two Generations. Silent, four reels. The story of a young man and his inherited Kentucky farm and forest; better forestry practices applicable to hardwood forests and the necessity of keeping out forest fires illustrated.

Approved Sheep Management on National Forests. Silent, two reels. Scenes in the life of the sheep herder, including some magnificent mountain views in Montana and California; approved management methods and marketing activities shown.

Tax-Reverted Lands Studied in Arkansas

In Little River County, Ark., more than 300 landowners, or about 1 in 7, have been unable to pay their taxes for 1929 or earlier years, and as a result 20,000 of the total 349,440 acres of land included in the county have reverted to State ownership. This summer a group of men representing the University of Arkansas and the United States Forest Service have examined sample areas of this tax-reverted land and have classified them on both a physical and an economic basis. By analyzing the resulting data they expect to learn something about the reasons why this land has been relinquished to State ownership and something about the uses to which it is best adapted. L. M. Turner, assistant professor of forestry, and O. J. Hall, assistant professor of rural economics, are collaborating in this study with R. B. Craig, assistant forest economist of the Southern Forest Experiment Station. The university and the station have each provided one other field investigator.

Little River County borders on Texas and on Oklahoma. Woodlands compose 67 per cent of its area. Its fertile bottom lands are devoted principally to producing cotton and corn, but support some bottom-land hardwood timber. The eastern half of the county consists of flat to gently sloping plains at a level from 25 to 40 feet above that of the bottoms. Here shortleaf pine, loblolly pine, and hardwoods

grow in mixture, in farm woodlands and in larger blocks under corporate ownership. On the rolling uplands that form the western half of the county timber occupies a somewhat smaller area and is largely restricted to farm woodlands.

Professors Turner and Hall and Mr. Craig have classified sample areas as to topography, general physical character of the soil, and erosion. They have recorded present use of land; proportion of pasture, crop land, and timberland; timber species; quality of sites for timber production; and proportions of timberland occupied by old-growth and second-growth timber. A 5 per cent cruise has been made of lands bearing merchantable timber, which will give figures indicating volume of timber per acre, site quality, and volume growth of timber in the last 10 years. Economic data cover ownership, residency of owner, status as to delinquency, and year for which taxes are delinquent. The study includes about 37 per cent of the tax-reverted land in Little River County. For purposes of comparison it takes in some areas in the county that are tax delinquent but have not yet reverted to the State (as of June 10, 1932, lands in this classification total 100,587 acres), and also some areas on which the taxes are paid. In addition to the classification of specific delinquent areas a study is being made of the finances of the county government over a 5-year period.

Economic and agricultural conditions in Little River County are believed to be representative of those in several counties of southwestern Arkansas. In Washington County, chosen by the university as representative of the Ozark region, Professor Hall has plotted tax-reverted lands preparatory to a study similar to that in progress in Little River County.

For Arkansas as a whole the proportion of tax-reverted land is about 4½ or 5 per cent. This percentage is only a little above the average for the seven States—Florida, Alabama, Mississippi, Louisiana, Arkansas, Oklahoma, and Texas. The Forest Service hopes that it will be possible to duplicate the Arkansas study in each of the six other States named.

Doctor Herty Hopes to Eliminate Sap Stain in Pine Pulp

Sap stain, or blue stain, can probably be avoided in pines used for making paper pulp by utilizing the log immediately after the tree is cut. Discovery of this method of eliminating the problem caused by the stain was recently announced by Charles H. Herty. A green log put through the pulping process at the experimental laboratories at Savannah, Ga., of which Doctor Herty is in charge and where he has already established the suitability of slash, loblolly, and longleaf pines for use in the manufacture of paper pulp, turned out a pulp practically as white as the bleached product of the paper mills.

Observations indicate that sap stain will appear in the wood within two weeks after the tree is cut, although the exact time it takes for the fungus producing it to attack the wood has not been definitely determined. Use of green wood means that seasoning can be eliminated, the timber owner being able to take his logs to the pulp mill as soon as they are cut, and that the mill, by using the logs at once, can eliminate or considerably decrease bleaching costs.

While he has shown that the manufacturing process can get ahead of the sap stain and that the green log produces a remarkably white paper pulp, experiments with the grinding machine have yet to be made. Doctor Herty anticipates that these will show a longer fiber and whiter and better pulp. Results of treating green log chips with the sulphite process, which removes the lignin and leaves isolated the cellulose fiber from which the pulp is made, indicated this probability by producing a strong white fiber, and Doctor Herty believes the ground wood pulp from the same green logs will show up equally well.

Defoliating Insect Active in California Brush Fields

By HUBERT L. PERSON, United States Forest Service

The California tortoise-shell butterfly (*Aglais californica*), which caused widespread defoliation in the Shasta brush fields in 1910 and 1911, is becoming abundant again in the redwood region. J. M. Miller, of the United States Bureau of Entomology at Berkeley, reported the occurrence of this defoliator on the Stanislaus National Forest above Strawberry, Calif., in 1930 and in parts of southern Oregon in 1931. During the early summer of 1932 reports of the complete defoliation of large areas of blueblossom (*Ceanothus thyrsiflorus*) were received from cut-over areas of the Union Lumber Co. on the Redwood Creek drainage of Mendocino County. One defoliated area of nearly 100 acres was said to appear from a distance as a brownish patch surrounded by green blueblossom.

On June 24, 1932, an area of about 30 acres in Humboldt County was found infested by the California tortoise-shell butterfly and was examined. It supported an almost pure stand of blueblossom, 8 to 12 feet in height, with occasional clumps of redwood sprouts, willow, hazel, thimbleberry, huckleberry, and Baccharis. Blueblossom was plainly the preferred host, as it was completely defoliated throughout the infested area. The large number of dead upper branches indicated that many of the bushes had also been attacked in 1931. Of the other vegetation only the willow growing in with the infested blueblossom had been affected, and it was only partially defoliated.

At the time this area was examined most of the caterpillars were mature or had already pupated. The mature larvae are about 1½ inches in length and

black with grayish hairs. Each abdominal segment is armed dorsally with a black, compound spine. When ready to pupate they fasten themselves to a twig by the last abdominal segment and hang head downward. In a short time the dorsal wall of the thorax splits open and the chrysalis, which has been forming inside, emerges. A slight disturbance starts these pupae wiggling violently, and this movement transmitted to the twigs from which they are hanging gives the infested brush fields a startling appearance. The butterflies begin to emerge about July 1 and probably lay their eggs during July.

It is open to question whether this insect is beneficial or harmful in the redwood region. The brush is not usually killed by one defoliation, and where it is killed by repeated attacks the amount of browse lost may be more than equaled by the increase in other forage resulting from the opening up of the brush fields.



An area of 64,255 acres of marsh at the mouth of Bear River, on the north shore of Great Salt Lake, Utah, has been set aside as the Bear River Migratory Bird Refuge. About 40 per cent of the area is to be used as a public shooting ground and the remainder will be reserved as a bird sanctuary. Administration of the refuge is under the Bureau of Biological Survey of the United States Department of Agriculture.



The Long-Bell Lumber Co. confined its fire damage last year to 29 acres of its holdings of 91,000 acres in Arkansas. The company is keeping its woods in continuous production, and fire protection is one of its chief concerns.



Based on the percentage of renewals for the 5-year period ending with 1930, an average life of 23 years for creosoted ties was reported by seven railroads. Some of the ties were sound and in service after 34 years.



By an act of Congress approved July 14, 1932, the District of Columbia has become a bird sanctuary. Shooting of wild waterfowl within the District is prohibited by this law.



A gift of about 3,400 trees and shrubs, representing nearly 1,500 species and varieties, has recently been made by the Boyce Thompson Institute for Plant Research, of Yonkers, N. Y., to the New York Botanical Garden.

Foreign Notes

Mangrove Swamps of Kenya

Mangrove swamps cover about 180 square miles of Kenya, South Africa, according to an estimate quoted by R. M. Graham in the Journal of the East Africa and Uganda Natural History Society. On only about two-thirds of this area can the forests be classed as merchantable.

The commonest and by far the most important tree of the swamps is mkoko (*Rhizophora mucronata*), which grows to a height of about 60 feet and a diameter of about 15 inches. When grown in close stands in good mud, mkoko has a straight cylindrical bole. Its bark is easily stripped from the stems. A striking characteristic of this species is its stilt roots. About the second or third year the first of these roots emerge from the stem at a height of a few inches and grow down into the mud. By the time the tree is well grown it has roots starting about 3 feet or more up the stem. The lower part of the stem, as a matter of fact, after developing to a diameter of not more than 2 or 3 inches becomes unnecessary to the tree and rots away, as do the roots first formed. Old roots are tough, woody, gnarled, and sometimes branched. Roots may be sent down from the stem or branches at a height of 20 feet, but such roots do not become fixed in the mud.

The seed germinate on the trees. The resulting embryos, usually about 15 inches long and $\frac{1}{4}$ inch in diameter, are pointed at the base and are somewhat thickened for a few inches above this point, so that when they fall they automatically plant themselves in the mud if the tide is out. Embryos falling at high tide float away in a vertical position. It is thought probable that they retain their vitality for many weeks in salt water and are carried considerable distances by the tides and by ocean currents. In good mud the planting of the embryo is followed in about 15 days by the development of underground roots and shortly thereafter by the appearance of leaves. In sandy mud roots may not appear for three or four weeks, and in pure sand they may fail to grow at all.

Mkoko is hardy. Stunted and deformed specimens can be found growing in such unlikely localities as coral outcrops.

Muia (*Bruguiera gymnorhiza*), the largest of the Kenya mangroves, grows to a height of about 80 feet. Individuals of such height, however, are nearly always stagheaded. This tree has no stilt roots, but is buttressed and also throws up knee roots.

Poles are the most important product of these swamp forests. In 1929 about 470,000 poles were sold from the swamps, and about 40,000 were issued free to natives for housebuilding. Most of those sold were exported to Arabia and India. Sales of 1929 included

446,000 stacked cubic feet of firewood. Mkoko bark was formerly sold in large quantities for the sake of its tannin; but since the bark of trees less than 6 inches in diameter has no tannin value and practically all the stands of large mkoko have been cut, this source of revenue is largely exhausted.

Mexico Requires Reforestation of Exploited Timberlands

A decree of the President of Mexico dated May 11, 1932, requires the artificial reforestation of timberlands by individuals or companies removing the forest cover from such lands. The decree reads as follows:

ARTICLE 1. Cooperative organizations which exploit forests existing on communal or public lands, as well as persons or companies carrying on such exploitation works on private properties, are obliged to effect the artificial reforestation (of such lands), in accordance with the provisions of the present decree.

ART. 2. It shall be obligatory to effect works of artificial reforestation in the following cases:

- I. When, in the opinion of the responsible professional forester, natural reforestation is impossible;
- II. When continuous natural regeneration, in the case of coppice, has caused the degeneration of the trees;
- III. When the method of treatment justifies the complete clearing of the lands, be they forest or coppice, provided they are not devoted to agricultural cultivation; and
- IV. Invariably, when the authorized exploitation within a year is greater than (a) 2,500 cubic meters of logs of ordinary, cold-climate woods; (b) 1,000 cubic meters of logs of fine, warm-climate woods; (c) 75 tons of resin; or (d) 20 tons of chicle.

ART. 3. The works of reforestation to which the previous article refers shall have as their principal object the replacement and the improvement of the species of trees the exploitation of which has been authorized.

ART. 4. Professional foresters under whose direction the exploitation of forests is carried on shall attach to their respective technical studies the general reforestation program which, in their opinion, it is necessary to carry out.

ART. 5. The Ministry of Agriculture and Development, through the forestry, game, and fishing section, shall control the reforestation works that are carried on in the country, assisting as much as lies within its power toward the greatest development and distribution thereof.



Willow scab, a fungous disease which first appeared in Nova Scotia seven years ago, is spreading rapidly in the Canadian Maritime Provinces. The spores are carried by wind and rain. The disease causes defoliation of willow trees.

Germination of Wattle Seed Studied in South Africa

Wattle trees having become the source of raw material for an important and growing tanning industry in South Africa since their introduction into the country from Australia about 50 years ago, both black wattle (*Acacia mollissima*) and, to a lesser extent, green wattle (*A. decurrens normalis*) are widely grown there for their bark.

Like many other leguminous seed, those of *Acacia* remain viable for a number of years, lying dormant until conditions are favorable for germination, one of these being a certain amount of heat. Where plantations are established by direct sowing, it is the custom in South Africa to treat the seed with boiling water before planting in order to obtain rapid germination. Natural regeneration in a cut-over plantation is obtained quickly by broadcast burning of the slash. To ascertain the most effective methods of treating wattle seed to insure a high percentage of germination, laboratory and field studies were made by J. B. Osborn, research officer of the Natal Tanning Extract Co. (Ltd.), and E. Osborn, as the result of which the following conclusions were reached:

For all classes of seed of both green and black wattle the best method of pretreatment so far discovered is to place the seed in a receptacle of boiling water (which is then set aside to cool) and allow them to soak overnight or for 10 to 12 hours. The volume of water used should be several times that of the seed to insure contact of all the seed with the water, so that mucilage in the seed coat will be dissolved. After removal from the water the seed should be thoroughly air-dried.

The general physical appearance of the majority of seed remains unchanged by this treatment. It is a fallacious idea that the seed should be boiled or soaked until they are soft. Boiling for 20 minutes kills a certain proportion, while the reduction in germination of seed boiled for 2 hours was 30 to 50 per cent.

Storage after treatment with boiling water for periods of 3 weeks to 11 months improves germinating ability.



Two organizations have recently been founded in Sweden to promote and safeguard the interests of the wood-pulp industry. They are the Swedish Cellulose Association, representing the chemical pulp industry, and the Swedish Wood Pulp Association, representing the mechanical pulp manufacturers.



Unemployed persons in Prussia can obtain free wood by thinning stands of trees under direction of the Prussian Forest Service. They are also allowed to

buy firewood which they have cut from dead or defective trees for 25 to 40 cents a cord or to work out the cost by planting trees. More than 200,000 cords of wood were cut in Prussia under these arrangements during the nine months ended January, 1932.

Stumps Removed by Electrical Process in British Columbia

A new method of clearing land of stumps is being adopted in the Fraser Valley, British Columbia. An electrically operated fan supplies a direct draft to a fire lighted in the roots of the stump to be destroyed; the air driven at high pressure through a hose fitted with an iron nozzle feeds oxygen to the flames. The fire is helped along with kerosene or other inflammable material until the air blast is under way. The stump is soon consumed by this forced combustion and may be quickly removed.

The method is cheaper than the use of dynamite and donkey engines as well as being less dangerous, and it is easier than hauling out the stumps by team and tackle. It is said that electric current for the new device costs about the same as that for a vacuum sweeper.



Average annual loss from forest fires in the Dominion of Canada during the 5-year period 1926-1930 was \$4,876,000, in round figures, according to the report of the Director of Forestry for 1930-31. The total is made up of the following items: Loss of merchantable timber, \$2,489,000; estimated loss through destruction of young growth, \$1,080,000; estimated loss through burning over of cut-over land, \$166,000; value of other property burned, \$403,000; actual cost of fire fighting, \$738,000.



In Bulletin 80 of the Canadian Forest Service, British Columbia Softwoods, Their Decays and Natural Defects, the Forest Products Laboratories of Canada have published descriptions of the characteristics, properties, and uses of the softwoods of the Pacific coast of British Columbia and of their various fungi and insect enemies. Measures for prevention of decay of these woods with a list of antiseptics and preservatives known to be beneficial are given.



Forestry commissioners of Great Britain planted 32,330 Douglas-fir trees on sites in England, Wales, and Scotland in 1930. All these trees were raised from seed furnished by the Canadian Forest Service through its seed extracting plant in New Westminster, British Columbia.

Personals

Officers elected for the coming year at the annual meeting of the Association of State Foresters held in New Jersey October 17-19 are: W. G. Howard, superintendent of lands and forests of New York, president; George C. Joy, supervisor of forestry of Washington, vice president; George R. Phillips, State forester of Oklahoma, secretary-treasurer; and G. M. Conzett, director of the division of forestry of Minnesota, and Page S. Bunker, State forester of Alabama, members of the executive committee.

Hugh P. Baker has resigned his position as dean of the New York State College of Forestry at Syracuse University to become president of the Massachusetts State College, Amherst, Mass.

F. A. dos Santos Hall, assistant professor of forestry in the University of Lisbon, Portugal, who has been studying forest mensuration methods in America for a year under a Portuguese Government fellowship, left in September for Lisbon to resume his professional duties. Much of his time here was spent in the Washington office of the United States Forest Service, where he studied construction and use of volume tables for estimating timber stands. He also took several trips into eastern and southern forest regions, making an extensive tour of the naval stores producing forests of Florida.

R. V. Williamson has recently been placed in charge of a new research laboratory in McCloud, Calif., by the McCloud River Lumber Co. and the Shevlin-Hixon Co., of Bend, Oreg. The two lumber companies have united in equipping the laboratory, where experiments will be carried on to establish new uses for pine products, with particular emphasis on ponderosa pine.

F. G. Miller, dean of the school of forestry of the University of Idaho, has returned from Europe where he spent a period of sabbatical leave visiting the principal timber-producing regions and studying European forestry methods and practices.

Henry I. Baldwin, formerly in charge of forest investigations for the Brown Co., Berlin, N. H., will spend the academic year 1932-33 teaching silviculture in the Department of Forestry of the Pennsylvania State College, substituting for Asst. Prof. H. J. Lutz, who is studying for a Ph. D. degree at Yale University.

Howard W. Morgan, who has been with the Oxford Paper Co., Oxford, Me., for five years, has been appointed instructor in pulp and paper manufacture at the New York State College of Forestry of Syracuse University, of which he is a graduate. Mr. Morgan took an active part in the development and operation of the Oxford Co.'s research laboratory.

S. B. Show, regional forester of the California region of the United States Forest Service, has been reappointed a member of the State labor camp committee for 1932 by the Governor of California.

C. H. Coulter, former assistant State forester of Florida, has been appointed cooperative agent to assist naval stores operators in developing improved naval stores practices in Florida under a cooperative agreement between the Florida Forest Service and the Bureau of Chemistry and Soils of the United States Department of Agriculture. Mr. Coulter will perform the function of carrying to the operators information obtained by research at the Southern Forest Experiment Station and the Naval Stores Station. He will make his headquarters at Lake City, Fla.

Ralph C. Hawley, professor of forestry at the Yale School of Forestry, has been appointed associate editor in charge of dendrology, silvics, and silviculture of the Journal of Forestry. He succeeds Carlos G. Bates, who recently resigned.

Ellwood Wilson, formerly forester for the Laurentide Paper Co., Quebec, now professor of silviculture at Cornell University, has been presented with a scroll of recognition by the Canadian Society of Forest Engineers in appreciation of his services to forestry in Canada.

Nelson C. Brown, professor of forest utilization at the New York State College of Forestry, Syracuse University, has been appointed a national director of the Izaak Walton League of America for a term of three years.

Walter J. Quick, jr., assistant State forester of Maryland, has been granted an eight months' leave of absence which he will spend at the Yale School of Forestry working for the degree of master of forestry.

Percy M. Barr has accepted a permanent appointment as assistant professor of forestry to teach forest mensuration and management at the University of California. Doctor Barr, who for some years has been in charge of the research division of the British Columbia Forest Service, taught at the University during the second semester of the school year 1931-32. C. D. Orchard succeeds Doctor Barr in British Columbia.

Nels E. Peterson, district ranger on the Angeles National Forest, has been awarded the 1932 Harvey S. Bissel gold medal for the most outstanding accomplishments in forestry and fire prevention among officers of Federal, State, and county forestry organizations in southern California.

Nineteen fellowships have been granted this year by the New York State College of Forestry, Syracuse University, to graduate students especially qualified to take up advanced work. Fellowship appointments have been made to: Arthur J. Barry, B. S., New York State College of Forestry, for work in paper and pulp manufacture; Charles E. Beardsley, B. S., University of Minnesota, in forest utilization; Mason B. Bruce and David Campbell, New York State College of Forestry, in silviculture, one-half each for second semester; Frederick S. Crysler, B. S., New York State College of Forestry, in forest chemistry; W. E. McQuilkin, B. S., University of Nebraska, in botany; N. D. Wygant, B. S., Purdue University, in forest entomology; Walter C. Gates, B. S., New York State College of Forestry, in forest utilization; Ellwood S. Harrar, jr., B. S. and M. S., New York State College of Forestry, in wood technology; Arne Haugberg, B. S., Royal College of Agriculture, Norway, in utilization; John H. Hawkins, B. S., Michigan State College, in forest management; Ludwig V. Kline, B. S. and M. S., New York State College of Forestry, in forest botany;

George Kratina, B. S., New York State College of Forestry, in wood technology; James S. Kring, B. S., Colorado Agricultural College, in forest botany; Kenneth O. Maughan, B. S., Brigham Young University, and M. S., New York State College of Forestry, in recreation and park engineering; F. M. Meade, B. S., New York State College of Forestry, in silviculture; Nelson F. Rogers, B. S., New York State College of Forestry, in forest management; A. R. Sanford, B. S. F., University of Maine, in forest management; Eric W. Stark, B. S. F., Purdue University, in wood technology; and R. A. Vogenberger, B. S. S., Penn State Forest School, and M. S., Penn State College, in silviculture.

Changes recently made in the organization of the Pennsylvania Department of Forests and Waters include the transfer of W. E. Montgomery from the position of chief of the bureau of accounts and maintenance to that of chief of the bureau of forest management and parks. Alfred E. Rupp has been permanently designated chief of the bureau of lands.

Bibliography

A 10-Year Series of Naval Stores Experiments

By AUSTIN CARY, United States Forest Service

Lenthall Wyman, associate silviculturist in the Forest Service, who has for nearly 10 years been engaged in experimental work on naval stores practice, gives an account of his results up to the year 1930 in Technical Bulletin 298 of the United States Department of Agriculture.³

The industry in the interest of which Mr. Wyman works is an old one in this country, going back nearly to the time of earliest settlement. It is unfamiliar, however, to many people living elsewhere than in the South. So Mr. Wyman begins his statement somewhat in the historical line. Rather more than most industries, it appears to him, the business of naval stores has been conducted on traditional lines, with low efficiency and extensive waste of raw material resulting. However, several foresters were at work in the field of naval stores investigations even earlier than Mr. Wyman, the industry itself has as he says been reasonably open-minded toward reform, and so for a number of decades now things have been progressing.

The study itself is detailed and technical. In order to appreciate it one has to understand the method by

which raw gum is got out of the tree. Mechanically, the process of producing gum is the following: A clay or metal cup is hung at the base of the tree to be worked, and strips of metal are so fixed above the cup as to lead the gum into it; then, beginning as close above this installation as possible, the tree is cut across the grain, with a special tool called a "hack." To this wounding the tree responds with a flow of gum. The wound is repeated weekly, each successive cut being made just above the last. At three or four week intervals the cups are emptied and the gum obtained is transported to a central point for stilling.

It is with the economics of this operation and with its relation to the tree's health and sustained yield that Mr. Wyman has been dealing. His plan has been to work trees in groups of 50 or more each, regulating the work done accurately, weighing the yield of gum by groups, finally making comparisons.

Some things that might be inferred at once nevertheless needed proof and quantitative determination. In the first place, Mr. Wyman has found that yield gains fast with added size in the trees worked. He correlates specific yields with specific sizes. Further, he infers that vast numbers of trees commercially worked are unprofitable. A tree's environment, too, affects its yield; open standing trees with generous crowns yield significantly more than trees of the same diameter that are crowded. Individual variation in yield is another thing that has come out. Of two trees of the same size that look alike and stand in similar

³ Experiments in Naval Stores Practice. 60 pp., illus. 1932.

relations, one may yield two to four times as much as the other. Microscopic study has not determined any structural ground for such individual difference. That fact, of course, takes the work out of the strictly mathematical or mechanical class, calling for repetition of tests with large numbers of trees and for the use of averages.

Mr. Wyman has carried out elaborate experiments in "chipping," the weekly wounding of the tree from which the flow of gum results. These experiments are concerned largely with three details: The best width of face; the best depth of chipping; and the best rate of progress up the tree, current yield of gum and the maintenance of the yielding power of the tree both considered. A large part of the bulletin is given over to recording in detail the results of these tests. Mr. Wyman has borne in mind also the structural and physiological facts involved.

In relation to existing practice in the region Mr. Wyman's findings are conservative, but in recent years commercial practice has to some extent been going along with him.

A European Method of Calculating Tree Volumes

By R. A. CHAPMAN, United States Forest Service

A new and rather interesting method of computing tree volumes is presented in a recent bulletin of the Société Centrale Forestière of Belgium.⁴ It is based on a fundamental idea of calculus, that "the volume of a solid generated by revolving a plane figure about one of the axes is equal to the product of the area of that figure and the circumference of a circle described by the center of gravity." This is expressed by the equation

$$\text{Volume} = \pi 2ra$$

in which π equals 3.1416, r is the radius of the circle described by the center of gravity, and a is the area of the plane figure to be revolved about the axis. The author realizes the impossibility of obtaining the exact value of the unknowns (a and r) in this equation, and uses an estimate of their value. The area (a) is obtained by summing the equally spaced radii and multiplying by the distance between them. The radius (r) is obtained by dividing the sum of the radii by the number of measurements.

The accuracy of these approximations depends upon the taper of the tree and the distance between radii. The estimate of the radius (r) is biased. It is always larger than the true value. To offset this bias 3 is substituted for π . The formula used by the author

in computing tree volumes when diameter measurements are taken at 1-meter intervals is:

$$V = 3 \frac{\Sigma d}{2} \times \frac{Md}{2}$$

where Σd represents the sum of the diameters and Md the mean diameter. The volumes of 15 trees were calculated by this method and by cubing each section. The average deviation of these volumes was 2.59 per cent.

For rough work this formula undoubtedly will prove satisfactory. However, the practice in the United States of measuring diameters in inches and length in feet makes it necessary to add a converting factor to the equation. Also, as it is impossible from a practical standpoint to take measurements at 1-foot intervals, a term representing the distance between radii must be added. The equation may now be rewritten as follows:

$$\text{Volume} = \frac{\Sigma d}{2} \times \frac{Md}{2} \times L \times K = \frac{3}{4} \Sigma d \times Md \times L \times K$$

where Σd represents the sum of the diameters measured, Md the average diameter, L the length of interval between diameter measurements in feet, and K a converting factor ($\frac{1}{144}$).

It might be well to add that this method is only applicable where the diameter measurements are uniformly spaced.

Effects of the Drought of 1931-32 on Southern Pine

By W. R. MATTOON, United States Forest Service

A clear, full statement by Austin Cary, logging engineer of the United States Forest Service, analyzing his observations on the effects of the severe drought from June, 1931, to May, 1932, upon longleaf and slash pines in southern Georgia and northern Florida, has been published in serial form in the Naval Stores Review.⁵ Doctor Cary has had 14 years' experience in the southern pine region. His study of the direct and secondary effects of a severe drought on turpentine stands of longleaf and slash pines is probably the most thorough, critical, and helpful yet made.

The drought of 1931-32 was of 12 months' duration. Its effects upon living timber began in earnest by September, 1931, and the year ended with a deficiency in rainfall up to 20 inches. Stream flow became increasingly light and ponds dried out during the early fall. Only two periods of slight relief occurred—in December, 1931, and in March, 1932. The first turn from the mounting deficiency in rainfall began on May 18, 1932; June rains were abundant in some places, spotty

⁴ Di Tella, G.: Un Nuovo Metodo di Calcolo del Volume degli Alberi Attirati (Metodo Guilduo Mathiesen). L'Alpe, June, 1932, pp. 171-174. French translation in Bulletin de la Société Centrale Forestière de Belgique, August, 1932, pp. 438-445.

⁵ Cary, Austin: On the Recent Drought and Its Effects. Naval Stores Review, July 23, 1932, pp. 14-15; July 30, 1932, pp. 14-15, 20; August 6, 1932, pp. 14-15, 18-19.

in others. By way of comparison, Doctor Cary refers briefly to the drought of 1913 and in detail to the severe one of 1924-25, when great numbers of trees died directly or through insect attack and the turpentine business was practically suspended.

General observations were made over an area of about 10,000,000 acres in southeastern Georgia and northeastern Florida. The essential elements of the drought situation throughout this region are summed up by Doctor Cary as follows: Lack of normal rainfall results in severe drying of the upper soil layers, which lowers the ability of the trees to get sustenance; imperfectly nourished trees grow at a slower rate, yield less than normal amounts of resin, become subject to "dry facing," and attract destructive insects; number and severity of fires are increased by dry weather.

An intensive study was made in Columbia County, in northeastern Florida, on an area of about 5 by 6 miles in extent, selected as typical of the region. Here, as early as August, 1931, numerous longleaf pines which were being turpentineed were seen to be in bad condition, but the operators continued working them on the supposition of rains coming soon. At least three-fourths of the subsequent heavy losses of trees, it is believed, could have been prevented by stopping work in August. *Ips* beetles girdled the weakened trees and spread very rapidly. Trees died within a few weeks after being attacked. By December, 1931, 75 per cent of the timber on many small areas was dead. The insect attack received a slight check through the light rains which occurred in January. The trees affected were mostly open-grown, thrifty longleaf pines. Some round (uncupped) timber died, but it suffered far less than timber that was being worked. After heavy losses in midwinter additional trees died during the spring from insect attacks. Forests in normal health are seldom attacked so extensively and with such heavy losses as were the trees in this area. The normal flow of resin in healthy trees is generally sufficient to drown the attacking insects. In this case drought and fire combined with turpentineing caused the forests to be ravaged. The fact that this region is underlain with a porous or spongy form of limestone favorable to extreme drying out of the soil no doubt aggravated the drought conditions.

Similar close studies were made from time to time in several other localities with a view of determining so far as possible the cause of losses of living timber. In Charlton County, Ga., just east of the Okefenokee swamp, patches of dead timber were found coexistent with underlying deep and very dry soils, while living timber close by was on lands with better subsurface conditions, either of organic matter or sand and clay layers which stored up and held moisture. In Clinch County, Ga., losses were heavy in a body of larger and older slash pine being worked heavily for the third time. Another similar body of timber that began to die in August, 1931, and also was badly infested with *Ips* beetles, grew on land underlain with a clay that became stony

hard when dry. This turned the roots and held no store of moisture for times of need. In Alachua County, Fla., a working in slash pine showed bad faces and yellowing tree tops by October, 1931. This should have been sufficient warning for stopping turpentine operations. The timber in bays, mostly slash, suffered worse from dry facing than the longleaf growing on slightly higher ground. The working by this owner was conservative in all points but one, the cutting of extra streaks to pay winter expenses. This is believed by Doctor Cary to have been the last straw that caused the losses. Rains in March, 1932, although light, caused a prompt and well-marked freshening up of the faces. A good many million feet of longleaf and slash in Dixie, Jefferson, and Taylor Counties, Fla., died because of the ravages of fire in the midst of the drought.

The losses of timber from drought in general show a fairly close relation to the kind of turpentine working practiced. Round, or unbled, timber appears not to have died in any quantity. Timber that was virgin (or first worked) in 1931 suffered relatively lightly, though it did dry face to a considerable extent and the drying out usually went up the trunk above the face.

Timber being worked for the fourth year and worked-out timber ready for the sawmill suffered heavy losses up to a maximum of 70 per cent of all trees on one half-section (320 acres).

The losses of timber by death due directly to drought in practically all cases were closely correlated with underlying soil conditions, especially the composition (whether sand or clay), the depth and arrangement of soil layers, and the capacity of the soil for acting as a reservoir. Drought is far-reaching in its effects on soil. It not only deprives the surface layers of their moisture but if prolonged it depletes also the lower reserve supplies from which the upper layers are in ordinary times replenished by natural processes. Drought in summer is likely to have far more serious effects than at other seasons because the soil moisture evaporates faster and the rate of transpiration by trees is greatly increased.

In general, testimony shows that moderately dry years are favorable to increased naval stores production. In this drought yields fell off perceptibly, and, apparently contrary to previous experience in droughts, they fell off gradually rather than abruptly.

An unusual form of dry facing was observed which, so far as known, occurred extensively for the first time during this drought. It consists of a pitch soaking or drying of the wood under the bark of the tree and above the face. It was first noticed in Florida, where an operator was raising aprons on vigorous slash timber. The faces looked normal with a good covering of gum from last season, but when the new streak was cut the wood above the face was found to be dry, gum soaked, and nonyielding. This condition has since been observed in other places, quite extensively in some instances.

Fires were unusually prevalent and extremely severe due, of course, to drought conditions rendering the

woods highly inflammable. Great numbers of good-sized trees were killed; many that did not die were scorched and defoliated and their growth greatly retarded. An enormous quantity of pine reproduction was killed. Vast numbers of trees were put out of production; trees already affected by the drought were weakened and the way opened to insect attack. In addition, fire burned up quantities of naval stores equipment.

Slash pine in bays and ponds on muck soil is particularly liable to total destruction by fire in very dry times, because the soil itself may feed the fire or burn out deeply and cause the uprooting of the trees. The point is brought out in the articles that the feeding roots of the tree are near the surface and the burning of even the scurf of organic matter may serve to damage or kill the trees. The ability of longleaf to withstand the effect of fire, as compared with that of the other native pines, is commented on as a cheering reflection.

How long do the effects of drought persist in the southern pine region? Specific references are made to observations which point to the probability that for several years to come and perhaps permanently the growth rate of this severely scorched timber will be much set back, and that serious infestations of insects may set in months after the trees appear to have recovered. Many scorched turpentine trees, however, which were not worked too soon, recovered under rest and yielded good gum flows the next season.

Certainly the drought of 1931-32 has cost the South heavily in money values, running far up into millions. In the opinion of some this portion of the South has been set back at least five years. It is undoubtedly true that the loss to the naval stores industry would have been vastly greater had not its members in the last 10 years greatly lightened and improved their style of work. It seems not unlikely, in fact, that in the past year alone the industry has been repaid for all its effort and expenditure in this direction.

Utilization of Bigleaf Maple

By W. D. BRUSH, United States Forest Service

To date, the Forest Service has issued 10 bulletins covering the utilization of individual species and groups of species of commercially important woods of the United States. These species-utilization bulletins contain information for the assistance of users in determining the suitability of the wood for specific uses and for converting the timber to the best advantage into its various products. These data are also of value to timber owners seeking markets and to others desiring general information on the commercial importance, characteristics, and uses of the various woods.

United States Department of Agriculture Circular 225, Utilization of Bigleaf Maple of the Pacific Northwest, by H. M. Johnson, of the Forest Service, is a valuable addition to this series. The principal topics

covered by the publication are range, amounts used, properties, uses by industries, seasoning, lumbering, and transportation. Very useful data are given, including transportation costs and prices of stumpage, logs, and lumber. The sections on seasoning, methods of lumbering, and transportation are particularly worthy of commendation for the practical information presented. A considerable number of illustrations help to depict methods of utilization in an effective manner.

Bigleaf maple, with an annual cut of only 1 per cent of the total production of maple in the United States, reaches commercial importance only in the coastal region of Washington and Oregon, its natural range. It has much lower strength values than the common hard or sugar maple of the eastern United States, but because of the scarcity of hardwoods in the West it is important locally, being largely used in furniture and chair industries, the products of which were valued at \$12,000,000 in 1927. Statistics show a large increase in the use of bigleaf maple from 1910 to 1928 (the last year for which data are given).

The future importance of bigleaf maple can not be judged because no estimate of the marketable supply is at present available, due in large part to the poor quality of many of the stands. The increased difficulty, mentioned in the circular, of obtaining ample supplies at market prices may indicate a probable future scarcity. Higher prices for logs might maintain or even increase the cut; on the other hand, increased costs might result in the substitution of eastern hardwoods, such as red gum. Increasing markets for furniture in the West combined with the scarcity of native hardwoods there may provide a greater future demand for this wood. The Census of Manufactures shows an increase in the total value of wooden household furniture manufactured in Washington and Oregon from approximately \$9,000,000 in 1927 to \$11,000,000 in 1929.

The amounts of bigleaf maple consumed by the various industries in 1928 in Washington and Oregon as given in this circular differ by about 10 per cent from those of maple used in manufacture in those two States in the Forest Service statistical study for the same year.⁶ Figures on the production of bigleaf maple lumber in the bulletin are considerably greater than those shown in Bureau of the Census statistics; this is presumably due to the inclusion of the cut of numerous small hardwood mills in the two States not included in the Census figures.

One not familiar with the details of wood structure may have some difficulty in understanding the much-condensed discussion of the structure of bigleaf maple wood. This may be increased by the fact that one or two of the terms used in the illustrations do not agree with those in the text. For instance, "pores" are mentioned in the text but shown as "vessels" in the figures. "Wood fiber" in Plate 1 should be "wood

fibers," and this term is not mentioned in the text at all. In the same plate, "width of annual rings" should be "width of annual ring" or perhaps better "annual ring"; it might also be of value to the reader to know the degree of magnification of the wood sections.

This publication should be of much practical value to anyone interested in the hardwoods of the Pacific Northwest.

Recent Books and Pamphlets

Beal, J. A.: Control of the turpentine borer in the naval stores region. 18 pp. illus., map. (U. S. Department of Agriculture circular 226.) Washington, D. C., 1932.

Blackman, M. W.: The Black Hills beetle (*Dendroctonus ponderosae* Hopk.). 97 pp. illus., diagrs. (New York State College of Forestry technical publication 36.) Syracuse, N. Y., 1931.

Buchholz, E.: Zustand und entwicklungstendenzen der russischen wald- und holzwirtschaft. 132 pp. illus., maps. Langensalza, H. Beyer & Söhne, 1932.

Deam, C. C.: Trees of Indiana. Ed. 2, rev., 326 pp. illus., maps. (Indiana Department of Conservation publication 13.) Indianapolis, Ind., 1932.

Felt, E. P., and Rankin, W. H.: Insects and diseases of ornamental trees and shrubs. 507 pp. illus. New York, The Macmillan Co., 1932.

Gamble's International Naval Stores Year Book for 1932-33. 112 pp. tables, diagrs. Savannah, Ga., Thos. Gamble, 1932.

Grøn, A. H.: Bidrag til skovøkonomiensteori. Vol. 1, 630 pp. diagrs. København, Levin & Munksgaards forlag, 1931.

New York Reforestation Commission: Report, 1932. 23 pp. illus., map. Albany, N. Y., 1932.

Peck, M., and others: Economic utilization of marginal lands in Nicholas and Webster counties, W. Va. 64 pp. illus., maps. (U. S. Department of Agriculture technical bulletin 303.) Washington, D. C., 1932.

Spring, S. N., and Guise, C. H.: Forest planting on the farm. 42 pp. illus. (Cornell University extension bulletin 226.) Ithaca, N. Y., 1932.

Toumey, J. W.: The Yale demonstration and research forest near Keene, New Hampshire. 106 pp. pl., map., tables. (Yale University School of Forestry bulletin 33.) New Haven, Conn., 1932.

United States Congress, House Committee on Public Lands: Granting remaining unreserved public lands to the States; Hearings on H. R. 5840, a bill proposing to grant vacant, unreserved, unappropriated, nonmineral lands to accepting States, etc. 248 pp. Washington, D. C., 1932.

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United States Congress, Senate Committee on Public Lands and Surveys: Granting remaining unreserved public lands to States; Hearings on S. 17, S. 2272, and S. 4060, bills proposing to grant vacant, unreserved, unappropriated lands to accepting States and for other purposes. 437 pp. illus., map, tables. Washington, D. C., 1932.

Wisconsin Committee on Land Use and Forestry: Forest land use in Wisconsin. 156 pp. maps, diagrs. Madison, Wis., 1932.

Articles in Periodicals

Forestry Chronicle, June, 1932.—The effect of the birch leaf skeletonizer and the sawfly leaf-miner on the growth of birches in New Brunswick, by L. J. Simpson, pp. 89-92.

Journal of the American Society of Agronomy, May, 1932.—Effect of soil reaction on the early growth of certain coniferous seedlings, by H. L. Sundling and others, pp. 341-351.

Mitteilungen aus Forstwirtschaft und Forstwissenschaft, 1932.—Die rotbuche 1931, by E. Wiedemann, pp. 96-201.

Recent Publications of the Forest Service

Technical Bulletin 305-T, Strength and Related Properties of Redwood, by R. F. Luxford and L. J. Markwardt. 10 cents.

Circular 225, Utilization of Bigleaf Maple of the Pacific Northwest, by Herman M. Johnson. 15 cents.

Farmers' Bulletin 1123, Growing and Planting Hardwood Seedlings on the Farm, by C. R. Tillotson (reprint). 5 cents.

Farmers' Bulletin 1177, Care and Improvement of the Farm Woods, by C. R. Tillotson (reprint). 5 cents.

Farmers' Bulletin 1680, Farmers in Northern States Grow Timber as a Money Crop, by W. K. Williams (reprint). 5 cents.

National Forest Administrative Maps: 1-inch, Hiawatha, Marquette, Ottawa, Green Mountain, Crook (Mount Graham division), Gila (McKenna and Pinos Altos divisions); $\frac{1}{2}$ -inch, Wenatchee, Santiam, Snoqualmie, Siskiyou, Wallowa, Ottawa, Siuslaw, Arapaho, Lolo (eastern half), Kootenai, Bighorn, Mendocino, Modoc, Routt, Eldorado, George Washington, Nebraska, Apache, Sierra, Marquette, Hiawatha; $\frac{1}{4}$ -inch, Tonto, Columbia, Mount Baker, Weiser, Plumas, Arapaho, Coeur d'Alene, Routt, Bighorn, Fremont, Roosevelt, Modoc, Cache, Gila, Lincoln, Fishlake, Shasta, Coronado.